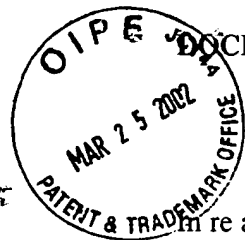


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In re application of:

Michael Cronin, et al.

Serial No.: 10/071,673

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For: DOWNLOAD OF USER INTERFACE ELEMENTS  
INTO A MOBILE PHONE

Group No.: 2681

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Sir:

CLAIM FOR PRIORITY UNDER 35 U.S.C. § 119

Pursuant to 35 U.S.C. § 119, applicant requests benefit of priority based on the following foreign application(s) listed:

German Patent Application No. 201 04 839.6

A certified copy of the foreign application is enclosed.

Respectfully submitted,

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**Prioritätsbescheinigung über die Einreichung  
einer Gebrauchsmusteranmeldung**

**Aktenzeichen:** 201 04 839.6

**Anmeldetag:** 20. März 2001

**Anmelder/Inhaber:** OPTIMAY GmbH, München/DE

**Bezeichnung:** Download of User Interface Elements into a Mobile Phone

**IPC:** H 04 M, H 04 Q

**Bemerkung:** Die nachgereichte Zeichnung Figur 1 ist am 20. November 2001 eingegangen.

Die angehefteten Stücke sind eine richtige und genaue Wiedergabe der ursprünglichen Unterlagen dieser Gebrauchsmusteranmeldung.

München, den 11. Februar 2002  
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## Download of User Interface Elements into a Mobile Phone

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### Description

The invention concerns in general data transmission in mobile communication systems and especially a mobile phone, a system for mobile communication and a system for configuring a mobile phone.

Communication systems are intended to serve the needs of a variety of users and especially mobile communication systems are of increasing interest for speech communication as well as for data transmission applications. Hardware as well as software incorporated therein encounters reduced life-times and competition of different service providers often is based on the functionality and variety of the offered services.

At the very moment, it is in many cases necessary to buy new hardware for using new services or some new functionality of elder and already established services. Moreover, if a retailer was unable to sell his products within a certain period of time, it is very likely that severe price reductions and associated losses at the retailers side will occur. Selling of these products which after a short period of time are not on the edge of the recent development is becoming increasingly difficult.

Accordingly, it is an object of the present invention to improve the functionality of mobile phones, systems for mobile communication and to avoid any unduly reduced life cycle of such communication devices.

5        Moreover, it would be helpful to have respective tools at the retailer's side to "update" or upgrade mobile phones and functionality thereof.

10        The above objects are achieved with a mobile phone comprising a receiver and a transmitter for receiving and transmitting radio frequency signals, respectively, a digital processor for processing digital data and a digital memory for storing digital data wherein said digital memory comprises data which are downloaded from an external data source and said downloaded data comprises executable  
15        software.

Advantageously, said digital memory comprises pre-stored run time software and downloaded data comprising executable software as in such an embodiment of a mobile phone updated or upgraded functionality could be provided on the basis of  
20        the executable software comprised in the downloaded software.

4        If said external data source is a base transceiving station of a mobile communication system then a modular system of different run time modules could be used to increase the number of available functions of a mobile phone  
25        on demand, i.e. if a connection between the mobile and the base transceiving station is established whereas any undue complexity of the mobile phone or expensive components could be remarkably reduced. Such services are of increasing interest in view of future Internet functionality, especially  
30        in case of WAP communication channels.

Any data exchange with a local data base or data base system is easily provided on the basis of an interface for exchange of digital data with external digital devices which

interface preferably is part of the mobile's electronic circuitry. To that end said interface for exchange of digital data with external digital devices preferably is adapted to exchanging data with a personal computer, a database system  
5 at the location of a manufacturer or re-seller, or a database of an Internet data service provider.

A very convenient and ergonomic way to display additional functionality comprises a keyboard comprising at least a section where a layout thereof is defined by the  
10 downloaded data. In a most preferred embodiment the mobile phone has an LCD-keyboard having keys with LCD-fields or a headline associated with and located in the vicinity of the associated keys of the keyboard.

Alternatively or in addition to the LCD-keys of the  
15 keyboard, the mobile phone comprises a display having at least a section where dialogues and/or menus are displayed, said dialogues and menus being provided by or based on the downloaded data.

If said display displays shows icons having associated  
20 functionality on a touch-screen area and these icons and associated functionality are provided by the downloaded data then a very efficient man machine interface is established having, based on the visual contents of the displayed icons, a high degree of intuitive user guidance.

Significantly, an acoustic man machine interface is  
25 defined if in a further preferred embodiment a loudspeaker of the mobile phone and electronic circuitry connected thereto for driving said loudspeaker utilizes said downloaded data to play melodies, to output speech messages and/or acoustic  
30 signals associated with functions of the mobile phone.

For a better understanding, the invention is described below in more detail in view of preferred embodiments and based on the attached drawings, wherein

Figure 1 shows a front view of a preferred embodiment,  
Figure 2 shows internal components of the preferred  
embodiment of Fig. 1, and  
Figure 3 shows a functional relationship between  
executable software, fixed resources and  
downloadable mandatory resources.

In the course of the detailed description of the  
invention several definitions appear to be helpful. These  
definitions are given below and are not intended to restrict  
the scope of the inventive teaching but rather to clarify a  
minimum content of the disclosure of the description and the  
appended claims.

#### Definitions

Executable software which in brief is also termed  
"executable" according to the description of the invention is  
software that comprises executable programs, software that  
configures, activates and/or deactivates devices or  
functional elements, such functional elements being hardware  
components, functionality of such hardware components or  
functionality provided by software providing virtual hardware  
functionality, especially software that defines and/or  
realizes virtual machines, software that provides machine  
functionality, especially software that provides functions of  
a mobile phone and/or adapts the mobile functionality to a  
service or functionality provided by a base transceiving  
station.

Digital in the sense of the invention is not restricted  
to binary or two state systems but includes all numeric  
processing systems, e.g. systems having a numeric basis of  
three or more.

Run time software in the context of the description contains all the functionality necessary to operate the phone, but in certain embodiments no resources and therefore no look and feel is defined.

Downloadable resource is any resource or software that can be compiled via the resource compiler in the mobile phone and downloaded into the phone, especially to complete the functionality described by the software with the information that defines the actual look and feel of the phone. A downloadable resource might also contain executable software.

A downloaded resource is a downloadable resource when downloaded into the mobile.

A Resource compiler is a PC-based program that allows the downloadable resource to be compiled and downloaded via the resource loader.

A Resource loader is a program, preferably a PC program, that downloads a resource into the mobile phone.

#### Detailed description of preferred embodiments

Reference is made now to Fig. 1 showing a front view of a preferred embodiment of a mobile phone and to Fig. 2 detailing internal components thereof. In general, the invention concerns a mobile phone 1 having a receiver 2 and a transmitter 3 for receiving and transmitting radio frequency signals, respectively.

Within the housing 4 of the mobile phone 1 a digital processor 5 for processing digital data and a digital memory 6 for storing digital data is accommodated and connected with associated circuitry for operation of the mobile phone 1 as is well known to a person skilled in the art.

In the preferred embodiment, radio frequency signals are transmitted and received via an antenna 7. However in a further preferred embodiment not shown in the Figures,

antenna 7 is completely accommodated in housing 4 and not seen from outside thereof.

As seen in Fig. 1, a keyboard 8 comprises a section 9 having numeric keys and a section 10 with keys having an own display, e.g. an liquid crystal or light emitting diode display, showing abbreviations or shortcut symbols of associated functions which are activated upon pressing of the key.

Main display 11 which in the preferred embodiment is a color liquid crystal display, especially a thin filed transistor (TFT) display, shows icons of associated functions in a lower section 12 thereof. Section 12 of the TFT display comprises a touch screen field at least at the location of the respective icons in section 12. Consequently, main display 11 defines in section 12 a part of keyboard 8 where where a layout of the keys is defined by the downloaded data or in absence thereof by the run time software.

Digital memory 6 comprises run time software stored in an EE-Prom as known to a person skilled in the art for an operation of the mobile phone 1 and comprises data which are downloaded from an external data source.

In a most preferred embodiment said external data source is a base transceiving station of a mobile communication system and transfer of data takes place via an established communication channel with the base transceiving station and the mobile phone during normal use or during certain time slots indication this download in the display 11 of the mobile phone 1.

As shown in Fig. 2, a loudspeaker 17 is accommodated within housing 4 and electronic circuitry is connected thereto for driving said loudspeaker 17. In the preferred embodiment, said downloaded data includes melodies, speech messages and/or acoustic signals associated with functions of



the mobile phone.

In the preferred embodiment, digital memory 6 comprises pre-stored run time software and downloaded data which define executable software adapted to the respective processor 5 or  
5 a respective part of the run time software interpreting the downloaded data and converting said downloaded data into executable software for processor 5.

If additional functions or functionality is provided by said downloaded data also a menu structure for these  
10 additional functions and functionality of the mobile phone is defined by the downloaded data and issued to the main display 11.

At a lower portion of housing 4 of mobile phone 1 an interface unit 13 is located. Said interface unit 13 has a  
15 receptacle type connector 14 for establishing of an electrical connection with a mating electrical connector of a serial or parallel communication cable which is not shown in the drawings.

In addition, an infra red communication  
20 transmitter/receiver 15 is located behind a infra red transmissive window 16.

Interface 13 is apt to exchange of digital data with external digital devices, preferably according to the IrDA FIR and according to the ASK-IR standard if an optical  
25 communication link is established or according to serial/parallel communication standards for exchange of digital data with serial/parallel communication links with personal computers if a data cable is used.

In general, interface 13 is adapted to exchange data  
30 with an external data source as e.g. a personal computer, a database system at the location of a manufacturer or re-seller, or a database of an Internet data service provider which external data sources are well known to a person

skilled in the art and not shown in the drawings.

For using Internet services, said mobile phone comprises an Internet interface, preferably according to the WAP standard, for exchanging data with Internet service providers.

The invention also is teaching a system for mobile communication comprising a mobile phone as specified above and in the claims. In the mobile communication system according to the invention, the external data source comprises a base transceiving station of a cellular mobile communication system.

In a preferred embodiment, the mobile communication system is a GSM communication system. In a further preferred embodiment, said mobile communication system is an UMTS CDMA communication system.

The invention also is directed to a computer system comprising a database in which data to be downloaded to the mobile is stored and which computer system is installed at the location of a manufacturer, wholesaler or vendor.

#### Technical features of the downloadable resources

#### General features of the resources

Every type of resource has a version number. The resource loader is a part or a module of the run time software or of an external data source and checks the compatibility between the resources and the run time software and it decides i) to compile the resource in the required format or ii) that this cannot be done and then, in the latter case, terminates with an error or a respective indication on display 11 of the mobile phone 1 or a display of the external data source.

The run time software in the mobile phone 1 checks that the downloaded resources are version compatible. When the resources are downloaded via a data cable, preferably an encryption algorithm is used to avoid other tools to access the mobile phone 1. The encryption is preferably based on the IMEI of the mobile phone 1 and the date and time when the resource is downloaded

The resource is downloaded using a layered approach. The program of the external data source has an individual serial number and an associated "level" of programming capability.

At every stage of the personalization of the mobile phone 1 based on downloading of specified resources, the program of the external data source is allowed to customize the resources at this level or lower, specifying the new level of these resources. It is not allowed to change resources with lower level number. In this way, it is possible to limit the number of modifications that can be introduced after a defined customization phase.

During manufacturing mobile phone 1 initially has no additional resources inside, only a standard list of resources covering basic functions of a mobile phone as e.g. establishing of a communication link with a local base transceiving station is available.

During manufacturing programming is a level 1 programming and everything can be changed. All the resources defined as belonging to level 1 cannot be changed at any other level later, i.e. cannot be changed by the user. These resources are shown as fixed resources 1 to k in Fig. 3.

In the post-manufacturing phase the following programming levels are used, when the manufacturer tailors the mobile phone 1 for a specific market this is level 2, a network operators programs at level 3, service providers at

level 4. These resources are shown as mandatory resources 1 and L. For end users programming is available at level 5 where optional resources are downloaded on demand. These resources are shown in Fig. 3 as optional resources 1 and M.

5        Menues are defined by the run time software and the downloaded data linking fixed resources, mandatory and optional resources.

### Internationalization

10        The run time software publishes a set of T-messages, where each T-symbol is associated with a numeric value. The resource compiler creates a downloadable table with the following data: T-symbol numeric value text string with the translation for each language. In the structure of this  
15        table, a shortcut can be defined to avoid repetition of the same string, as in messages with no translation or in case of messages that correspond to the same string in a certain language.

20        The resource compiler in the external data source generates a table with the following global information for the run time software: Number of languages, textual description of each language to be used in the language selection menu, language group for each language, default language or an indication that the mobile should use the  
25        defined language of the SIM card, if a SIM card is inserted.

30        The resource compiler in the external data source detects duplicate translations and avoids multiple copies of the same text, handles a compression algorithm and issues a warning alerting the operator if a translation is missing.  
The resource compiler uses, for the missing translation either a default translation which is the English one or issues an error message like "Missing translation". This warning is always shown at a display of the external data

source when the resources are compiled.

If no messages associated with the resources are downloaded, an error message is issued on a display of the external data source in the English language. The same error message is shown upon downloading the specific resource in the main display 11 of the mobile phone 1. The lack of help text does not cause the run time software to stop.

### Sound samples

10       The run time software issues a set of SND messages, i.e. sound messages, and each SND symbol is associated with a numeric value of a specific resource defining a specific sound or tone.

15       The resource compiler in the external data source creates a downloadable table with the following data: SND symbol numeric value, i.e. sampled sound data for each language. A shortcut can be defined to avoid repetition of the same sound, as in case of no translation. The global information used by the resource compiler to generate the downloadable tables are the same used for the text internationalization.

25       The resource compiler converts the sound sample in the format required to be played by the mobile phone 1 and issues a warning to inform the operator in case of missing sound samples. The resource compiler uses, for the missing sound either a default one which is usually the English one or an error message like "Missing sound". The warning is always shown when the resources are compiled or, as an alternative, the compiler stops operating.

30       If a sound is not present, the run time software does not play anything.

### Animations

The run time software displays a set of required or optional animations AN on the main display 11 of the mobile phone 1. Each AN symbol has a numerical value.

5       The resource compiler in the external data source creates a downloadable table with the following data: AN symbol numeric value, AN structure that describes the animation. The resource compiler detects duplicate animations and avoids multiple copies, detects what bitmaps are required  
10       for an animation and compiles these. The resource compiler issues a warning to the operator if the animation is missing. The resource compiler uses instead of the missing animation a default "dummy" one. The warning is always shown when the resources are compiled or, alternatively, the compiler stops  
15       operating.

### Melodies

The run time software of the external data source issues a set of M-symbols associated with a specific melody or a  
20       specific sound, each M-symbol is associated with a numeric value. The resource compiler creates a downloadable table with the following data: M-symbol numeric value, description of the melody. The resource compiler generates a table with the following global information for the run time software:  
25       number of melodies, description of each melody, in the form of a T-symbol to be used in the melody selection menu

The resource compiler detects duplicate melodies and avoids multiple copies of the same text, issues a warning to alert the operator in the following situations in case of a  
30       missing melody or if melodies are defined as resources but not used. The resource compiler uses for the missing melody a default melody. The warning is always shown when the resources are compiled or, alternatively, the compiler stops.

The standard GSM-defined melodies, the DTMF and the key click of the mobile phone 1 are not defined via resources.

### Menus

5           In many cases, there is more than one menu in the system. The resource compiler creates a downloadable table with the following data. A structure defining all the parameters of the menu: choices x, y, w, h, styles, headline, a menu subclass, allowed automatic exit, does not quit  
10 because of timeout, type of menu: text based, bitmapped, animated, with or without scrollbar. A table containing all the items. For each item the following parameters are associated: T-symbol of the item. A pointer, i.e. the number of a internal resource of the software, terminal item,  
15 activate some functionality, or a pointer (i.e. resource number) to another menu (menu chaining). A pointer (i.e. a number of an internal resource) to a check mark and a flag for conditional activation.

20           The software does not need to publish any information about what menus must/should be present in the system, since the menu tree can be completely defined as a set of resources. However, the resource compiler has information on respective entry points of the menu(s).

25           For every entry point of a menu, the resource compiler specifies a top menu of a menu tree whereas no menu is also an acceptable choice. The resource compiler detects circular references between menus and issues a warning alerting the operator if a menu is missing. The warning is always shown in case of a missing menu when the resources are compiled.

30

### Dialogues

During programming, the run time software shows a list of the available dialogues in the system, with all the

information needed for the resource compiler to complete the look and feel during a later handling of mobile phone 1.

For the dialogues there is a set of dialog engines. These engines implement the behavior of the dialog, and they use external resources to define the look and feel. There is an implemented mechanism to link a menu item to a dialog engine. Each engine requires the presence of some standard dialogues to handle text entry, number entry, on/off, multiple choices. These standard dialogues are user-configurable via resources. A dialogue resource contains the identifier of a help text. The standard on-off dialog is configurable as: menu-based, toggle, bitmapped with one bitmap for the "on" state and one for the "off" state, animated with one animation for the "on" state and one for the "off" state.

The customizable portions in a dialog are the text of the dialog, the position of the text, the text of the softkeys, the keyboard. This customization is available for all the possible language groups. A dialog uses one or more melodies to indicate some relevant actions for example to indicate a selection made by the user. Normally, these melodies are all turned off by default. There is a selection dialog to turn them on.

## 25 Fonts

The software of the external data source displays a list of the required fonts. The resource compiler creates a downloadable table with the following data, font name, font data Specifying the format of the font. The resource compiler avoids duplication of fonts, i.e. if two required fonts are mapped to the same font resource, the latter is downloaded only once. The resource compiler handles a compression algorithm, especially in case of Chinese fonts, and issues a



warning to the operator if the specified font is missing or in case of fonts that are defined as resources but not used. If no fonts are downloaded, an error message is issued in English in the main display 11 or at the external data source.

### Keyboards

The software issues a list of the required keyboard components or keys. The resource compiler creates a downloadable table with the following data: Keyboard name, meaning of each key and control functionality of each key as f.i. the keydown, the repeat and the keyup events. For simple keys the sequence of characters is specified which is associated with a specific key. For international keys or keyboards including upper- and lowercase letters the sequence of characters for each key and for each language is specified.

The resource compiler avoids duplication of keyboards and of event/characters list, i.e. if the character, list for an international key is the same in all the languages, this is stored in only one resource to be downloaded. The resource compiler issues a warning to the operator in case of a missing keyboard or in case of keyboards that are defined but not used. If no keyboards are downloaded, an error message is issued in English, hardcoded in the base window.

### Technical features of tools for programming and downloading Internal tools

In a preferred embodiment, the resource language resembles or uses the Windows™ resource language, with the necessary additions and modifications to support customer or manufacturer specific resources.

### End user tools

The mobile phone manufacturer during the development phase has full capability to customize all of the resources. A textual description is used and preferred for tracking reasons. A graphical user interface with respective drag and drop functionality is provided at the external data source. Alternatively a command line based tool could be used to download an off-line developed resource file.

The end user tool is preferably run via the web, i.e. the Internet. Customization of the mobile is performed over the air interface via a data call. Each tool might be composed of one big executable or many different programs, but it is logically composed of the following parts, Resource editor, Resource compiler and Resource loader.

### Resource editor

The resource editor is a program within the external data source that allows for an easy editing of the resources in a graphical way. Copy, paste, drag and drop functions are supported in a similar way as e.g. in Microsoft™ Windows™. This tool is logically composed of many different parts (one for text labels, one for bitmaps and others but it seems to be only one application. The following file formats are supported when importing files, i) Sound MIDI files (MID), ii) Wavefiles for sampled sounds(WAV), iii) graphic file formats as f. i. bitmap files (BMP), GIF and animated GIF (GIF), PCX files (PCX) and WAP-related file formats.

### Resource compiler

The resource compiler is adapted to compile directly an intermediate file. The output of the compiler is a binary file for further downloading. Encryption of the data is

supported, since it is important to avoid access by unauthorized third parties to the compiler. The output is fed directly into the loader or saved into a file.

5    Resource loader

10       The resource loader is similar as the internal tool, but  
is integrated in the menu of the resource editor giving the  
impression of being only one application. The resource loader  
is directly logically connected with the resource compiler or  
is launched independently using a previously saved binary  
image of the resources. The decoding of the encrypted data is  
done inside the mobile phone 1, not within the PC-loader. The  
resource loader checks the brand of the mobile phone 1 and  
the version of the man machine interface (MMI) software in  
15   it, refusing to download if these information doesn't match  
with the resource to be downloaded.

Claims

- 5 1. Mobile phone comprising  
a receiver (2) and a transmitter (3) for receiving and  
transmitting radio frequency signals, respectively,  
a digital processor (5) for processing digital data and  
a digital memory (6) for storing digital data  
10 characterized in that said digital memory (6) comprises  
data which are downloaded from an external data source and  
said downloaded data comprises executable software.
2. Mobile phone according to claim 1, characterized in that  
15 said digital memory (6) comprises pre-stored run time  
software and downloaded data comprising executable software.
3. Mobile phone according to claim 1 or 2, characterized in  
that said external data source is a base transceiving station  
20 of a mobile communication system.
4. Mobile phone according to one of claims 1 to 3,  
characterized by an interface (13, 14) for an exchange of  
digital data with external digital devices.
- 25 5. Mobile phone according to claim 4, characterized in that  
said interface (13, 14) for exchange of digital data with  
external digital devices is adapted to data exchange with one  
of the group consisting of a personal computer, a database  
30 system at the location of a manufacturer or re-seller and a  
database of an Internet data service provider.

6. Mobile phone according to one of claims 1 to 5, characterized by a keyboard (8) comprising at least a section (12) where a layout thereof is defined by the downloaded data.

5

7. Mobile phone according to claim 6 characterized by a display (11) comprising at least a section where dialogues and/or menus are displayed, said dialogues and menus being provided by the downloaded data.

10

8. Mobile phone according to claim 7, characterized in that said display (11, 12) shows icons having associated functionality on a touch-screen area thereof which icons and associated functionality is provided by the downloaded data.

15

9. Mobile phone according to one of claims 1 to 8 characterized by a loudspeaker (17) and electronic circuitry connected thereto for driving said loudspeaker (17), said downloaded data comprising melodies, speech messages and/or acoustic signals associated with functions of the mobile phone.

20

10. Mobile phone according to one of claims 1 to 9 characterized in that said digital memory (6) comprises an EE-Prom.

25

11. Mobile phone according to one of claims 1 to 10, characterized in that said mobile phone (1) comprises an Internet interface for exchanging data with an Internet service provider.

30

12. Mobile phone according to one of claims 1 to 11, characterized in that said downloaded data defines a menu

structure for functions of the mobile phone.

13. System for mobile communication comprising a mobile  
phone according to one of claims 1 to 12 and an external data  
5 source.

14. System for mobile communication according to claim 13,  
characterized in that said external data source comprises a  
base transceiving station of a cellular mobile communication  
10 system.

15. System for mobile communication according to claims 12  
or 14, characterized in that said mobile communication system  
is a GSM communication system.

15

16. System for mobile communication according to claims 13,  
14 or 15, characterized in that said mobile communication  
system is an UMTS CDMA communication system.

20

17. System for configuring a mobile phone characterized by a  
mobile phone according to one of claims 1 to 12 and a  
computer comprising a database in which data to be downloaded  
to the mobile is stored.

Abstract

The invention concerns in general data transmission in mobile communication systems and especially a mobile phone, a system  
5 for mobile communication and a system for configuring a mobile phone. A mobile phone according to the invention comprises a receiver (2), a transmitter (3) for receiving and transmitting radio frequency signals, respectively, a digital processor (5) for processing digital data and a digital  
10 memory (6) for storing digital data and said digital memory (6) stores data which are downloaded from an external data source. Said downloaded data comprises executable software, menu descriptions, sounds and animations for the mobile phone (1).

Fig. 1

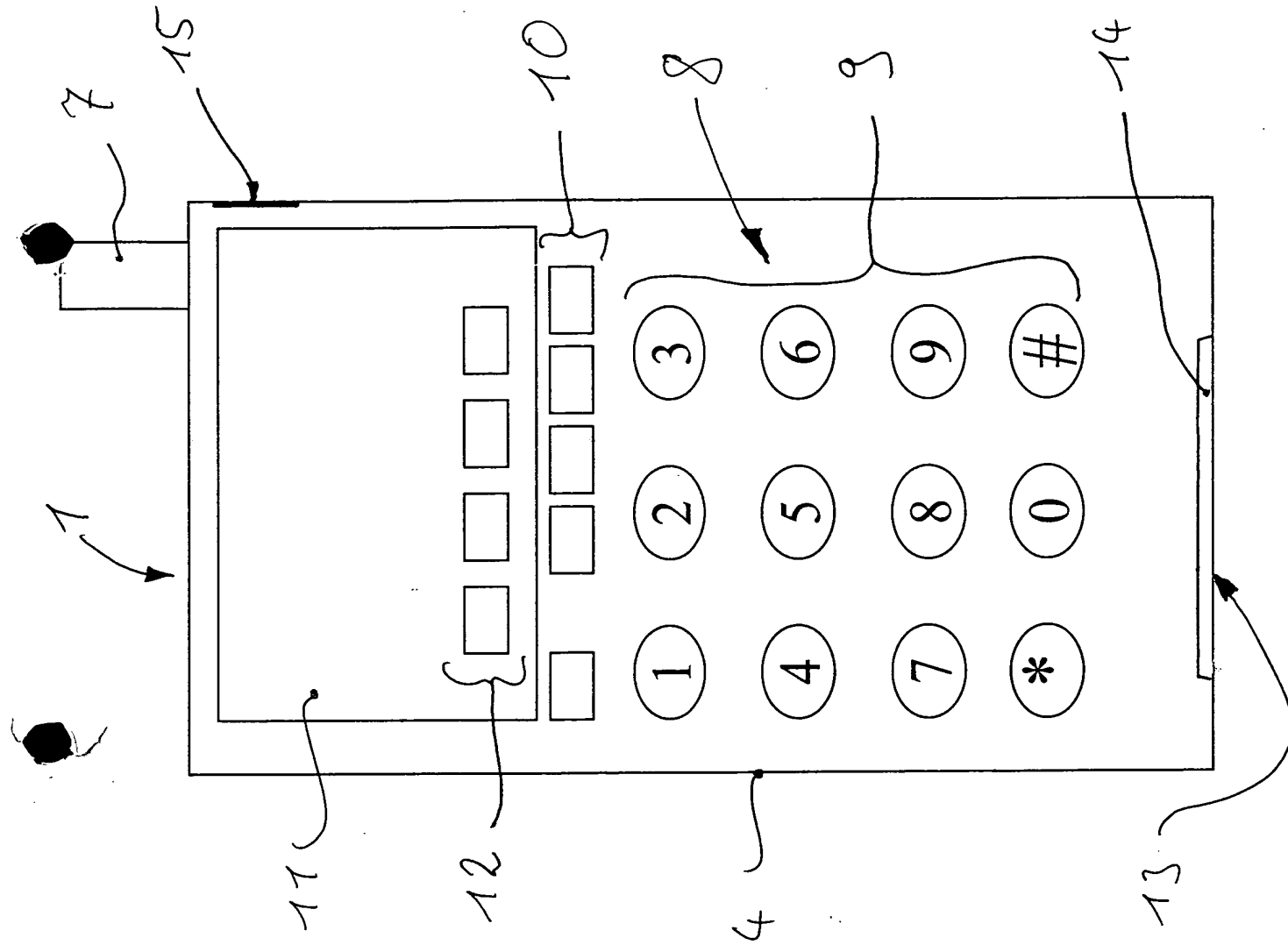




Fig. 2

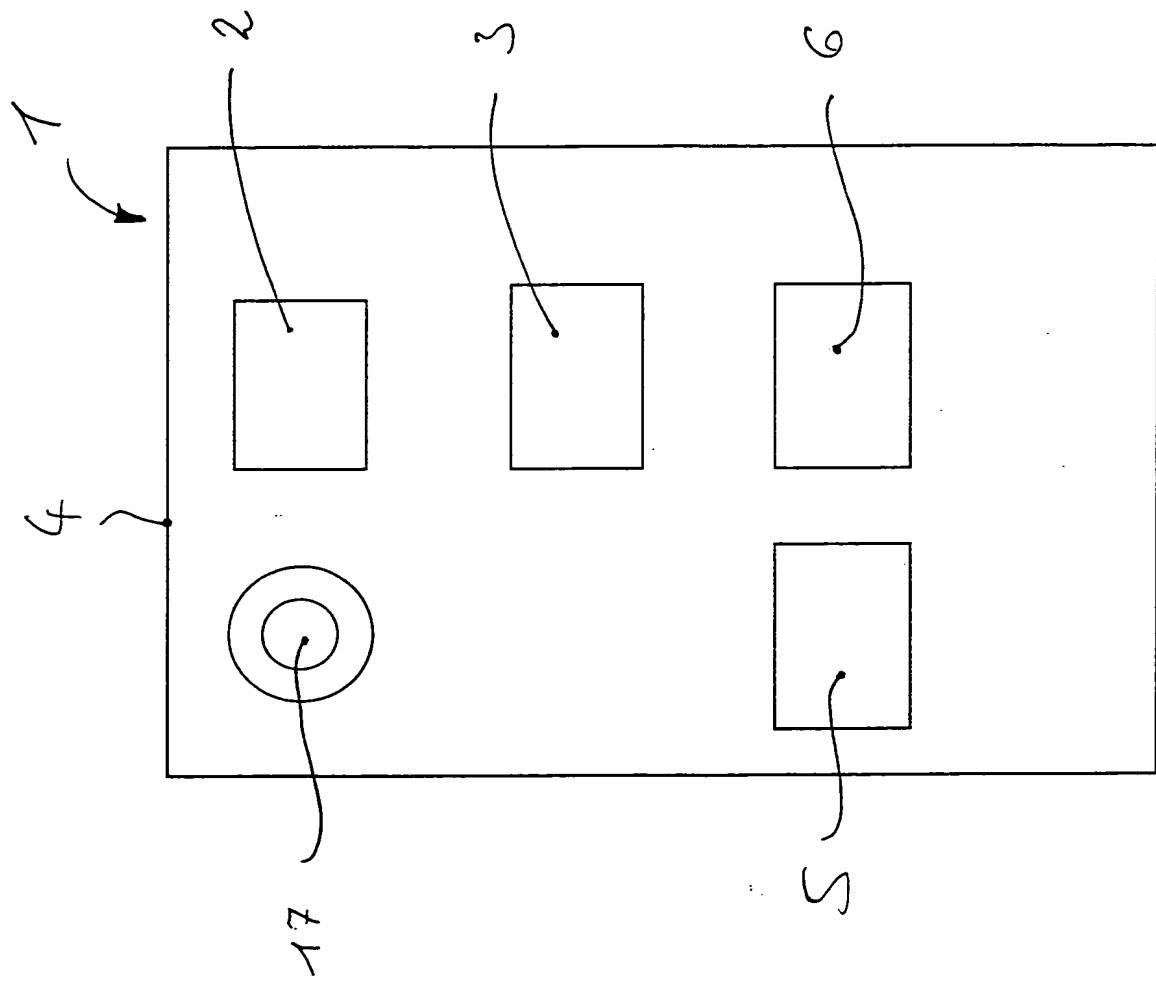


Fig. 3

